THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Problem-solving Teams In Shipbuilding

U.S. DEPARTMENT OF TRANSPORTATION
Maritime Administration and
U.S. NAVY
in cooperation with
Bethlehem Steel Corporation
Marine Construction Division

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FOREWORD

“There is one thing stronger than all the armies in the world:
and that is an idea whose time has come.”

—Victor Hugo

Companies in many industries are wrestling with the concept of employee involvement. Many managers agree that the "old stuff” is not working, but they are not really convinced that the “new stuff”, participative approaches, will work. Fear of and resistance to change are often stronger forces than concerns for productivity and competitive position. However, it is just such concerns as these which are mandating changes in the shipbuilding industry today. An important, but often neglected, element of the change process is the involvement of the work force.

Over sixty years ago experiments at the Hawthorne General Electric Plant revealed the problem: How do you properly manage the human resource? Ever since that time labor and management, consultants and academicians have been searching for the answer to the human resource problem. Capturing the loyalty of hundreds or thousands of individuals in one business enterprise so that they direct their energies toward common goals is enormously difficult. Only recently have we recognized that the primary objective of labor — jobs, and that of management — profit, are not mutually exclusive. We are heading into an era in which the human aspects of an enterprise will be given proper recognition along with the technology, marketing and production controls. We will find that a workforce which is energized and committed becomes the most powerful competitive resource of all.

ACKNOWLEDGEMENTS

The primary author is K. C. Smith, planner, Beaumont Yard who is also Management's Employee Involvement Specialist on the Employee Involvement Staff.

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Panel SP-5 set the objective for this project as follows: "To develop and implement an effective method of establishing problem-solving teams which can draw upon the knowledge and experience of all levels of shipyard employees."

This project is a part of the overall Employee Involvement process at Bethlehem's Beaumont Yard. The process started under the aegis of S. C. Perry, General Manager, now retired. It has continued under his successor, R. E. Blackinton.

Dr. Peter Lazes, Work Place Systems, Inc., served as the consultant for the process. We are grateful for his leadership and guidance. Dr. Lazes' associates were very helpful during the needs analysis and initial orientation phases, particularly Dr. Don Kane. We especially appreciate the work of Ron Mitchell during the orientation and training phases. The ongoing assistance and direction of Dr. Lazes and Mr. Mitchell have been most helpful.

The Employee Involvement process at Beaumont could not work without the cooperation and assistance of the Unions and Union leadership which represent the hourly workforce. Representation at the Yard is comprised of the Beaumont Metal Trades Council (Boilermakers, Electricians, Carpenters, Painters, Operating Engineers, Laborers and Teamsters), Local 195 of The United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industries of The United States and Canada and Lodge 395 of the International Association of Machinists.

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SECTION I

EXECUTIVE SUMMARY

Employee Involvement at the Beaumont Yard was modeled after the classic "Qualhy Circle" concept, employing major modhications adapted to the business conditions in Beaumont. The "cart and horse" arrangement of the classic Quality Circle process wherein teams are formed first and then decide what problems to work on was reversed in our situation. The initial "needs assessment", conducted in a participative fashion through employee interviews, provided the problem scenario which allowed the identification of the problems first and then the assignment of the right people to the right problem.

In capsule form, the process was formulated as follows:

1. Identify the problems
   A. Employee interviews (needs assessment)
   B. Solicit problems from employees via letter
2. Identify volunteers to work on the problem
   A. Solicit volunteers from the work force
3. Fit specific volunteers to specific problems, based upon the characteristics of the problem.

Early in the process it was determined that local business needs dictated a results-oriented effort. The Unions recognized a need to preserve jobs and Management needed a vehicle which would provide rapid cost effective results. Competition in the shipbuilding industry dictated a need by the Beaumont Yard to reduce operating costs. With these parameters in mind, the process was formulated as an "expedited process", to be heavily facilitated by the outside consultants, with the emphasis on immediate results.

The Beaumont Employee Involvement process was designed as a two phase process:

1. Problem-solving teams (temporary) of two types:
   A. EITs (Employee Involvement Teams) — Six teams meeting weekly, off the job, for up to two hours. As each team solved its problem, it was disbanded and a new team formed to work on another problem.
   B. SATS (Study Action Teams) — One team meeting regularly for up to forty hours per week handlin~ large, multiple department problems. This team also temporary, in that its membership changed as the problems changed.
2. Semi-Autonomous multi-skilled work groups (not multi-craft)
   A. Pilot project initially
   B. Work groups work in the production process
   C. Largely self-managing
   D. Ultimately to encompass the whole yard.

The ultimate goal of the employee involvement process was to create a new work place culture where participative management was the rule and hourly workers were encouraged to participate in the decision-making process thereby stimulating innovations in productivity. Utilization of the large pool of previously untapped job knowledge required a basic philosophic and management style change. This process, when developed to its fullest, could encourage this culture change.

The process at the Beaumont Yard was brief, lasting only seven months, due to a rapid business turn down. During this short period of time the program generated annual savings of 125,000 manhours, with a return of over 3:1 over cost. The change in culture was beginning to evolve, due to the high quality of problem solutions brought about by the Employee Involvement process. The short duration, however, aborted the long term change maturation process.

SECTION II

INTRODUCTION/OVERVIEW

Bethlehem Steel Corporation is one of the nation's major integrated steel producers. In addition to its steel producing and finishing facilities, it operates iron ore and coal mines in its Natural Resources Group, steel manufacturing facilities in its Manufactured Products Group and shipyards in its Marine Construction Division, including the Beaumont Yard in Beaumont, Texas.

The Beaumont Yard is a medium size marine construction facility employing 2,500 to 3,000 people during peak operations. It is primarily a designer and builder of mobile offshore drilling rigs, with extensive experience in shipbuilding, conversion and repair.

The Beaumont Yard hourly workforce is represented by nine craft unions. Labor relations over the years have been of the classic adversarial type. Probably the most significant cause of the adversarial relationship is that production and maintenance workers are treated as a casual workforce. There is lack of permanence to "their employment inasmuch as the size of the workforce fluctuates with the volume of work at any given time. (This is a situation not atypical of small tomedium size shipyards.)

Locally, because of the concentration of oil refineries and petrochemical plants, there are large memberships in craft unions which supply highly skilled tradesmen to contractors involved in maintenance, new construction and renovation of the petrochemical facilities.

These unions supply the skilled craftsmen to the Beaumont Shipyard. The ups and downs of the shipbuilding and repair business preclude sustaining the sometimes high level of employment required for large shipyard contracts, so employment levels at the Beaumont Yard have been as high as 3,000 employees and as low as 50 employees.

The insecurity brought about by this fluctuation in employment has caused the loyalties of the workers to be lodged, in large measure, with their unions rather than with their employer. When the shipyard lays off its hourly employees, those belonging to the union are able to secure employment in construction through the union hall, thus sustaining their income.

Somewhat as a consequence of this interaction between construction work and shipyard work, local wages have escalated over the years to the point where, in the last five years with the advent of intense foreign competition and a shrinking market, the Beaumont Yard has faced substantial problems in obtaining a full order book in a very competitive environment.

Because of the conservation measures undertaken by the U.S. and the effects of high petroleum products pricing, local refineries and petrochemical facilities were forced to reduce capital spending to compensate for reduced sales. This phenomenon caused serious reduction in construction contracts, and very low levels of construction craft employment in the Beaumont-Orange-Port Arthur area.

By mid-1982 the low level of employment in shipbuilding, plus the reduced demand for outside construction contractors, caused serious unemployment among skilled tradesmen in the area.

The militancy of the local workforce has long been a concern of Beaumont management and methods to reverse this trend have heretofore been largely unsuccessful (reinforced by the casual nature of hourly workers).

lThat contract language is included herein as Appendix A.

The advent of labor/management participation and quality circle movements in the U.S. was not lost to Bethlehem Steel management. A movement toward a more participative management style has been in effect throughout Bethlehem Steel Corporation since 1980. Several Bethlehem operations have had good success with worker participation processes. This message was being heard by the management of the Beaumont Yard.

Not until the general business downturn of 1981-1982 was the climate for major change a real possibility. Several factors combined to stimulate major changes in Iabor/management interaction.

1. Increase in foreign competition, particularly the Far East.
2. Reduction in construction outside the shipyard.
3. Local shipyard bankruptcies highly publicized.
4. Closure of several Gulf Coast shipyards.
5. Evaporation of the offshore drilling rig construction business.
6. Poor business conditions nationwide, highly publicized by the national media.

During the negotiations which resulted in the labor agreement of 1982, unions and management agreed to contract languagel which would enable the parties to pursue labor/ management participation efforts. Early in the 1982 labor contract term little was done to move ahead with these efforts.

By October of 1982, employment levels at the Beaumont Yard had declined to less than 100 hourly employees. This condition made it obvious to all parties that some action had to be undertaken to change direction in a major way.

The Beaumont Yard had lost its major market almost overnight, the national business economy was in poor condition and the Yard was faced with competing in the marketplace for business with shipyards having much lower cost structures.

During this same general time period, the corporate (BSC) labor/management participation effort was beginning to mature. Success stories from the Steel mills and fabricating facilities were being publicized internally through intercompany publications. Also during this time the General Manager and Assistant General Manager of the Beaumont Yard attended meetings at Corporate Headquarters and heard firsthand of some of the innovations taking place within the Corporation.

They also attended a Problem Solving Team meeting at Bethlehem's Sparrows Point shipyard in Baltimore, Maryland to view a process where management and union personnel sat together in a room and worked together to solve production-related problems. This meeting. convinced them that the principles involved could be put to work at Beaumont and that overtures should be made to the unions to get a formalized Employee Involvement effort underway.

SECTION III

CONSULTANTS

The unions were not initially receptive toward management's proposals for thk new venture into uncharted waters. They were suspicious that employee involvement might be work rules changes in dkguise, or some other subtle arrangement for altering the labor contract.

Management had not presented employee involvement as a "win-win" situation, where each party would profit from the effort. Instead, the same people who negotiated grievance procedures presented the information, and did so at the same table where normal adversary situations were discussed. The initial attempts to proceed were short circuited by a lack of planning and preparation.

Recognizing that forward progress toward labor/management participation required a unique approach, management elected to call in a third party. This person would not be an arbiter but an expert in the field of human resources innovation, particularly in the conduct of an employee involvement process in a unionized environment.

Since Bethlehem Steel Corporation had used consultants in its labor/management participation effort, its help was solicited in suggesting consulting firms which could be evaluated by the Beaumont Yard. BSC suggested several firms to the Beaumont Yard, and they were called in for interviews and presentation of their particular process. Firms that had employee involvement systems that appeared to fit the Beaumont situation were evaluated and ultimately one firm was determined to be acceptable to both the unions and Beaumont management.

Workplace Systems, Inc., headed by Dr. Peter Lazes was the firm engaged to assist Beaumont in its beginning efforts in employee involvement. Lazes' firm is associated with Cornell University and had previous experience working in a union environment in the shipbuilding industry.

Workplace Systems' basic philosophy stated that employee involvement in a unionized workplace cannot be implemented successfully without full participation by the unions. They must be full partners in the effort if long-term growth of the process is to be sustained.

As a first step in the process, the b-es team indicated that an "up-front" assessment of the organizational climate in the yard was necessary, in order to determine current operating methods; to identify the strengths and problems that exist in the yard and to determine the yard's readiness for change. The assessment, when analyzed, would provide the basis for determining the necessary change strategy from which an action and implementation plan could be developed.

In February of 1983, Dr. Lazes and his associates conducted an indepth assessment consisting of personal interviews with 20% of the Beaumont Yard workforce (salaried and hourly), about 230 people, over a two week period.

SECTION IV

ASSESSMENT

Upon completion of the "up-front assessment" by the consultants, a meeting was called at Beaumont for the purpose of discussing the analysis of the interviews conducted in February.

The interviews with hourly and salaried persomel in the yard primarily addressed the employee's attitude toward his or her job, and provided two major findings:

1. What's right in the yard? Employees of the Beaumont shipyard were generally quite satisfied with the technical content of their jobs. Pipefitters liked fitting pipe, welders liked to weld, material men liked to hustle material, secretaries enjoyed their office tasks, engineers and estimators enjoyed their work and supervisors liked to supervise. There was little evidence of "Blue collar blues" in terms of basic dissatisfaction with the technical or skill area of work.
2. What's wrong in the yard? Employees were concerned about the lack of feedback about their work.

   Production workers received only infrequent and generalized information regarding production manhour budg-

ets, schedules and overall progress. The message "We are behind" had lost its significance since employees have little appreciation of where the project stands.

Employees were quite dissatisfied with those aspects of yard operations that prevent them from: a) doing the quality of work of which they are capable, and b) gaining satisfaction in the knowledge that their efforts were appreciated.

Internal information sharing was considered to be another inadequacy in the yard. People did not feel they were well informed as to major developments within the yard (acquisition of equipment, new contracts, corporate policy changes, etc.). This communication problem was shared by personnel in engineering and other staff functions. The most consistent problem area reported both by management and production workers was that of inadequate scheduling, planning and coordination between crafts, shifts, and various departments within the yard.

Much emphasis was placed upon the level of rework entailed with the jobs currently in the yard and the subsequent close supervision that resulted. Tools and material availability were joint concerns of both production workers and their supervision Small tools and welding leads in particular were areas that caused intense rivalries between crafts.

Summarizing the principal findings of the assessment, the following nine issues were uncovered:

- Feedback
- Information sharing
- Employee involvement
- Coordination and cooperation between departments
- Rework
- Close supervision
- Tool and material availability
- Job enlargement
- Training

Upon presentation of this information to management, the consultants suggested possible interventions that would provide opportunities to address the problems and strengths by employee participation in a problem-solving process. The interventions suggested to address the issues were:

1. Multi-craft self-managing work groups
2. Single department self-managing work groups
3. Study/Action teams

Multi-craft self-managing work groups were recommended for adoption within the production departments. Multi-craft self-managing work groups would address all nine of the principal problems identified in the organizational assessment (e.g., feedback, information sharing, employee involvement, coordination and cooperation between departments, rework, close supervision, tool and material availability, job enlargement and training). These product-oriented production work groups with a fairly stable membership of individuals from a number of the crafts would be given responsibilhy for the efficient completion of clearly defined and budgeted work packages. These groups of employees, along with their first line supervisors, would be given significant freedom in the manner in which they accomplish their task.

The number of such groups within the yard, their individual sizes, craft compositions and life-spans, would be a function of the amount and nature of work that is in the yard at any point in time.

Each work group would be assigned a clearly defined work package, manhour budget and schedule. It would be this target, and not individual craft allotments, that would serve as the group's joint objective.

Each group would be self-managing in the sense that it would be given the responsibility and authority to determine and control its own line-up, working arrangements, tool requirements and manpower needs. Each group would also be responsible for checking on the availability and adequacy of material and engineering drawings for its work package. All such internal decisions would be monitored by management and a joint labor/management steering committee for the production departments to ensure that innovations do not negatively impact other groups or other departments and to ensure that successful innovations are communicated to other such work groups in the yard.

To the degree that self-management within these work groups will result in delegation of responsibilities to first-line supervisors and the employees on their tools, all levels of supervision would be provided more time to attend to critical inter-departmental matters such as the availability of tools and material, the adequacy of engineering drawings, more accurate estimates, better planning, appropriate training, safety improvements and longer term management concerns in general. One new and very important job of management would be to effectively match specific work packages to suitably constituted work groups.

Single-craft/department self-managing work groups were recommended as an alternative intervention in the production departments and as a primary intervention in plant maintenance.

Within production, such groups would function in much the same fashion as just described for multi-craft self-managing work groups. However, they would be formed solely of single crafts and would operate with single-system work packages, budgets and schedules. The introduction to production of such single-craft groups would address all but one of the principal findings of the assessment. It would have a minimal impact on the problem of inter-craft cooperation and communication. For this reason it was recommended here only as an alternative to the more powerful multi-craft work group approach.

Study/action teams were recommended as the intervention that addresses those problems that are not department specific, but cross department limes or might be all encompassing problems common to large segment of the production force. A study/action team is a group of employees which meets regularIy (and gathers information between meetings) to address a specific problem or set of problems. The size, composition,

intensity, activities and life-span of any studylaction team is contingent upon the nature and seriousness of the problems being addressed. Some might be internal to a single department, while others could be inter-departmental. Some study/action teams may meet intensively for only a matter of weeks, while others may find it useful to continue meeting on a regular, but less frequent, basis. These groups will also be monitored by a joint Iabor/management steering committee.

The study/action team concept is one which lends itself to addressing any and all of the principal findings of the assessment.

Upon completion of this initial orientation of management concerning the critical findings of the "up-front assessment", the consultants then presented the same information to all the unions connected with the Beaumont yard.

The next step in the assessment phase of the Employee Involvement process at Beaumont was to get the parties together to discuss the alternate interventions and attempt to reach a consensus.

Rather than repeat the mistake made by management in the beginning of the process, by calling a meeting at the yard, two off-site meetings were scheduled, one for each party, at which the alternate proposals would be discussed and preliminary decisions could be made.

The management "off-site" and the union "off-site" were held separately, and each group determined the priorities for the employee involvement process independently. The only hurdle remaining was to bring the two parties together to discuss their individual priorities and to reach a common ground which would form the basis for the employee involvement process. In August of 1984, labor and management met collectively and formed the labor/management policy and planning council. At this meeting it was agreed to postpone implementation of the multi-craft teams and the self-governing work groups in favor of the "study/action team" and several problem-solving teams. Also at this meeting, management and union Co-chairmen of the Policy and Planning Council were chosen.

As a result of this meeting, a letter was written to all employees outlining the decisions reached by the Policy and Planning Council to initially inform the total work force of the progress of Employee Involvement.

Following the progress report to the yard, the Policy and Planning Council met to create the functions that would manage the Employee Involvement prccess and to select the key people who would facilitate the process m a day-today basis. The employee involvement Steering Committee was organized with three members of management and three union members. The Planning and Policy Council recommended the personnel for the main operating unit, the Employee Involvement Staff, to the unions and management and received approval to appoint one department head as the Director of the staff on a part-time basis, and the appointment of two fdl-tirne facilitators, one from the union and one from management. Again, a letter was sent to all employees informing them of the key decisions made to date to keep all yard personnel updated on the progress of the process.

The final phase of orientation took place in January of 1985, when the consultants and the Employee Involvement Staff conducted an eight hour orientation session in a classroom atmosphere for all supervision and union stewards in the yard. Seven individual sessions on two shifts were conducted, bringing approximately 230 of the yard's managers, supervisors and union stewards to discuss Employee Involvement and its impact on yard management.

This orientation included a basic discussion of group problem-solving techniques, classroom exercises similar to those to be presented to the El participants and an indepth discussion of the role of middle management as resources to the process. At this meeting, the goals of the EI process were outlined and the supporting roles of supervisors were highlighted, emphasizing those areas which would affect the supervisors' daily activities. Emphasis was placed on the decisions made to date and the supportive role management was to play as the process matured. Key to these meetings was the attendance at each meeting by the General Manager, the Assistant General Manager, and other key managers which spoke to the issue of top management support for the Employee Involvement process.

Middle management and supervisors often view Employee Involvement as undercutting their historic role as the decision makers and problem solvers. This issue was discussed openly and put to rest by pointing out that Employee Involvement supports their role and allows them to address other issues of substantial importance to the production process. Participative management styles were discussed and their support of the Employee Involvement process was solicited.

SECTION V

PROBLEM/VOLUNTEER SELECTION AND ASSIGNMENT

Probably the most unique aspect of the Beaumont Employee Involvement process is that it was totally task or results oriented.

The issues faced by the Beaumont Yard were clear to all involved, survival was the issue, and productivity-related problems were the focus of the Employee Involvement process.

With these issues in mind, the process was designed to by-pass the sometimes lengthy process of problem selection by the problem-solving teams themselves. Following are the methods used to accelerate the process:

Once the employee involvement hierarchy had been established and trained and the yard notified of the current state of the process, the EI Staff and the Steering Committee drafted a letter to all employees requesting that they submit problems to the EI Staff. In the same letter volunteers were solicited for the process. The letter stated that problems related to Company policy, Union contract issues and gripes could not be addressed by Employee Involvement. The problems had to deal with issues that affected productivity, safety, housekeeping or other similar problems.

Within two weeks, the staff had received responses as follows:

1. Problems: 175
2. Volunteers: 185

The Steering Committee directed the EI Staff to review, consolidate and prioritize the problems. The 175 problems were consolidated into 20 categories. They were then prioritized using the following rating system:

1. How addressable is the problem?
2. How appropriate is the problem?
3. What is the anticipated cost of a solution (large or small)?
4. What kind of benefits can be expected (large or small)?
5. How long will it take to solve the problem?
6. How acceptable will the solution be to others?

These six questions were rated on a scale of 1-10 on each problem submitted, thus providing a basis for evaluation.

Once the problems had been evaluated by the union and management partners on the EI Staff, and they had reached agreement on the rating of the problems (the staff rated them separately to determine the problem priority), all the problems were assembled and placed within their particular category, with a rating sheet as compiled by the staff, attached, copied and prepared for the Steering Committee (six identical packages including all the problems, as submitted, consolidated into the 20 categories).

A meeting with the Steering Committee was called for the purpose of detailing the methods employed in prioritilng and categorizing the problems. Each member was presented a complete package of the problem/volunteer sets, along with the same rating sheets (blank) for their use in evaluating the problems themselves. The Steering Committee members were asked to review the problems and make their own judgment about the importance of each problem individually and to attend a meeting three days later when the problems would be prioritized by the group and a consensus developed concerning the assignment of the problems.

During the three-day period between the meetings each department head in the yard was visited by the EI Staff and all the problems submitted by his department personnel were discussed. It was imperative that those department heads affected by the problems be fully informed and be participants in the process from the start. me names of the individuals submitting the problems were deleted so there would be no possibility for future recrimination.)

During the discussions with the department heads, they were asked if any of the submitted problems could be resolved by the department without assigning it to a problem-solving team. Several minor problems were resolved immediately by this process.

Prior to the Steering Committee meeting, the Staff drew up flip charts listing all the consolidated problems in a manner that w$uld allow each Steering Committee member to have his individual rating of the problems listed separately. When rating points were assigned by each member, they could be added up to determine the problems with the highest priority rating.

During this same period, each volunteer was listed with his/her seniority date and department. (The purpose for indicating seniority was to prevent assignment of a very new employee to a long term problem, since workforce reduction plans would be in effect in the not too distant future.)

The Steering Committee meeting was held as scheduled and each member proceeded rating each problem on a scale of 1-7, with 7 being the most important. (There were to be seven problem-solving teams — one study/action team, and six problem-solving teams.) When all six Steering Committee members had individually rated the problems, the numbers were added up and the seven problems with the highest numerical ratings were chosen for the initial assignment to the problem-solving teams.

After the problem prioritization, team members were selected to staff the teams. If a problem was department-specific,

the team would be composed of that department's volunteers, plus others with skills related to the problem. Example: Pipe Hanger Identification Problem; selected two pipefitters, one mechanical draftsman (piping), one pipe sketcher, one dispatcher, two from paint and labor department and one person from the machinery department (machinists actually make the pipe hangers). A total of eight people was assigned to the problem, three salaried and five hourly. The purpose for the distribution was as follows: The hangers are produced by the machinery department, painted by the paint and labor department, delivered by the transportation department (dispatcher), used by the pipefitters and the problem solution would require some design and drafting work.

The Study Action Team was staffed differently since their problem was global in nature. The SAT had as its members the following: a civil engineer, a pipefitter, an electrician, a carpenter, a machinist, a welder, a shipfitter and a tool repairman.

Because the Employee Involvement process at Beaumont was a start-up venture the decision concerning the number of people to receive training was a complex one. Ultimate was decided to train only those people actually assigned to a problem-solving team and postpone further training unti teams had solved, or were approaching the solution, to their problems. The Beaumont process was developed in a manner that caused each team to dissolve when its problem had been solved. This would enable more people to become involved when new problems were selected.

In summary, the problem and volunteer selection process provided a means to get on with the task at hand and prevented the system from being bogged down by personal preference issues.

SECTION VI

TRAINING

Initially, the EI Staff received training at the Bethlehem Steel Corporation Offices during September, 1984, where intensive training in group process facilitation was presented.

The training course was entitled "EPG", Employee Participation Group Training, and concentrated on presenting effective techniques of facilitation of problem-solving groups. At this time, the staff engaged in actual problem solving within a group formed for this purpose. The group developed its own problem and processed it through the normal problem-solving "Six Step Process"[1] developing a solution through group consensus.

Throughout this training session the psychology of groups was emphasized since this is a major hurdle that must be recognized and coped with by facilitators. Methods for developing a classroom atmosphere conducive to creative thinking and keys to drawing out group participants who are reluctant to participate were some of the issues discussed.

Actual presentations of problem solutions, using visual aids created by course participants, were included. Speaking before groups took a significant percentage of the training, so that much experience in using facilitator tools was gained.

The second phase for facilitator training took place in Beaumont and was conducted by Dr. Lazes and his associates from Cornell University. This training took place from November, 1984 until January, 1985 on a regular basis at the training facilities in Beaumont. The emphasis of this training was placed upon group problem solving and was consistent with the training received at Bethlehem, although specific to the Beaumont organization. Additional training was presented concerning the course design for future training of Beaumont employees. The curriculum for the Employee Involvement training was developed and tailored to the regional influences of Southeast Texas. (Classic classroom exercises were structured to capitalize on the rural rather than urban backgrounds of the participants, i.e., hunting, fishing, football, etc.)

Significant emphasis was placed upon freeing the mind of traditional solutions to better address yard problems in unique and creative ways. This emphasis continued throughout the training and through the total process. Brainstorming and cause-and-effect analysis instruction were highlighted as well as techniques for implementation of problem solutions. Analytical techniques for charting the impact of problem solutions, in addition to statistical methods for gathering data, were developed in detail.

Concurrent with the training of the EI Staff, the Members of the Steering Committee received training in the problem-solving techniques to be employed by the problem-solving teams. Additionally, they were instructed in the methods to be used in substantiating problem solutions (statistical analysis, sampling techniques, and basic time and motion study). They were introduced to the group consensus theory and actually participated in exercises which developed difficult areas of prioritization of problem subsets and the detail of bringing about agreement by group members.

Employee Involvement team members were given three days of classroom training in problem solving, prefaced by a thorough discussion of Employee Involvement and its meaning to them and to the future of the Beaumont Yard. Unique to this particular process, the teams were trained together as a team, using the problem that had been assigned to them by the Steering Committee as a reference throughout the training period. This method allowed the team to make supervised progress toward their problem solution while still in training, thus shortening the total duration of the solution process.

The team training was broken down into the following elements:

[1] See Appendix E.

Day 1: Introduction to EmpIoyee Involvement

Consensus and Brainstorming instruction (liberally interspersed with practical exercises)

Actual group problem exercise (desert survival)

Advantages/disadvantages of groups

Listening skills

Use of group resources

Receiving ideas positively

Characteristics of effective groups

Day 2: Overview of Six Step Problem-solving Process

Two video tapes of actual problem-solving teams at work

Creative problem-solving film

Classroom exercises: nine dots, ping-pong ball in tube

Listening/communication

Problem-solving teamwork exercises

Day 3: Planning and conducting effective meetings

Use of agenda

Member responsibilities

Role of team leader and recorder

Work at preparations for solving their assigned problem.

Before the teams left the classroom they had begun to address their assigned problem and had the advantage of working closely with the experienced consultants and the EI Staff on the crucial initial phase of their problem-solving process. As they began, the consultants and the Staff could reinforce the process while it was still fresh in the minds of the participants and help alleviate the initial awkwardness of working together in an unfamiliar and challenging atmosphere. This aspect of the training was critical to the success of the problem-solving teams.

SECTION VII

PROBLEM-SOLVING TEAMS IN ACTION

John Greene, an hourlv pipefitter, stood in front of the classroom scanning his notes for the last tie. Surrounding him, involved in their own tasks were several of the other problem-solving team members. Two men were mounting graphs on a flip chart, while the engineer and the pipe sketcher were affixing blown-up engineering drawings on two easels in front of the classroom. The two men from the paint and labor department were distributing printed handouts of the problem solution to the positions where the invited guests would be seated.

This was going to be a unique experience for all the problem-solving team members. Never before had hourly people participated in the decision-making process at the Beaumont Yard. Now they were in the final stages of preparation for a presentation to the General Manager, Assistant General Manager, the Employee Involvement Steering Committee, five department heads and the Employee Involvement Staff.

John never thought that submitting a pipe hanger identification problem to the Employee Involvement Staff would thrust him into a situation like this. He was only interested in having someone address a nagging problem that he and his fellow pipefitters faced on a daily basis. Now, here he was, preparing to present to the top management of the shipyard the problem solution that he and his fellow team members had agonized over for five long weeks.

Ever since John had volunteered for participation in the Employee Involvement Process, and had submitted the problem about pipe hangers, he had wondered to himself whether this program was like others he had seen come and go in his years as a pipefitter at the Beaumont shipyard.

Unlike other programs, the Company had provided some excellent training in problem-solving techniques, which were mystifying at first, but as his team started working on their assigned problem during the training, the purpose for investigating group consensus, and brainstorming techniques, and the study of statistics and fact gathering gradually became evident. It was not easy to get everyone to agree on all the points concerning the problem. To John, the facts of the problem were so obvious. How come the others could not follow his logic? As the team saw the facts of the problem unfold, it gradually caught up with John, and when the understanding was complete, they had been able to proceed with the solution to the problem.

John was amazed at the suggestions that the team had made as they proceeded through the six-step problem-solving process. The power of the group had evaluated the problem, and after becoming familiar with the facts, had developed a unique and workable solution.

Now the team was ready to formally present its solution to top management and make recommendations for investing in

the hardware and training that wotdd provide a substantial productivity improvement for the yard.

As the invited guests arrived, and took their assigned seats around the horseshoe-shaped table arrangement, John wondered what was going through the minds of the Company ofilcials. Normally, they would be standing in his place preparing to make the presentation. John was hopefid that all the work and preparation would result in changing the yard in a small way.

Now that everyone was seated and the flip charts in place, the facilitator asked John to introduce himself and his team members to the guests. Then the guests introduced themselves to the team.

John began his presentation by explaining that his team had been assigned the problem of providing a means to identify pipe hangers, from a distance, where they were stored on the 800' Pier.

He explained that, currently, pipe hangers were stored in detail tubs, scrap tubs or just plain dumped on the ground on pallets in any place where ground space was available on the dock. In the process of moving heavy materials around during the day, the hangers became mixed together and scattered all over the 800' Pier, such that locating them became a chore and took valuable production time. dditionally, since pipefitters and welders work as a team, when the ipefitter was looking for hangers the welder was idled thus doubling the cost of locating the required materials.

Another irrhating and costly aspect of the problem was that the hangers (chair-type) are made in two separate pieces and the pieces became separated, thus doubliig the search effort again. Not only were the proper size hanger difficult to locate initially but the mating cap to the hanger was just as hard to find.

Compounding the problem even further, each pipe hanger required two bolts and nuts to join them around the pipe upon installation, and when the hangers were mounted to watertight or oil tight bulkheads, mounting pads of various sizes and thicknesses were required, each item dependent upon the size of the hanger, and since they were much smaller, they were even more difficult to locate.

In order to explain the magnitude of the time lost looking for pipe hangers and their component parts, John explained to his audience that the pipefitter had to leave his work site, sometimes up to 600' away from the access to the ship, and sometimes four or five decks below, causing up to ten minutes time just to get off the ship. Then, once the pipefitter was on the ground, locating the required materials could take up to 30 minutes (assuming he did not use this situation to visit the rest room, or coke machine, and assuming he did not meet a friend and discuss the latest sporting event).

John made use of his visual aids to point out these individual time increments and pointed out that leaving the ship could take up to ten minutes, looking for hangers might take up to thirty minutes, and returning to the work place another ten minutes, for a potential lost time of fifty minutes per trip. John then explained that this time represented the worst case scenario, and that, in fact, some trips took a total of only fifteen minutes. He then explained that this information gave the team only an order of magnitude idea of the potential time costs as a result of this problem and the justification to explore the actual costs in more detail.

He then turned the page on the flip chart and began to explain how the team determined the actual time lost in locating pipe hangers. Four members of the team were dispatched to the work site (a TAKX ship conversion) to interview individual pipefitters to determine how much time they actually spent looking for hangers, bolts and nuts and the mounting pads. Since there were over 200 pipefitters working on the job at this time it was impractical to talk to all of them. The team determined that interviewing ten to fifteen percent of the pipefitters would give them a statistically representative sample. They interviewed the required number of pipefitters and determined that the time lost was large but that no one could give specific enough information during the first interview. The team members asked the pipefitters during the initial interview to keep track of the actual time they spent during the next week looking for pipe hangers and related materials and to give it to the team members the following week.

The flip chart that John now displayed indicated the results of this survey. The chart information indicated that 30 pipefitters had been interviewed, and that they spent, on average, 3.25 hours per week' 'looking" for pipe hangers, caps, bolts and nuts and mounting pads. Although there were 210 pipefitters on the hourly payroll not all were directly involved in using rigid pipe hangers. It was determined that production welders, material hustlers and Ieadermen should be eliminated from the total in order to most accurately depict the extent of the problem. This reduced the affected workforce to 150 pipefitters.

Carrying this information forward on his next flipchart, John showed the extension of this information as follows: 150 x 3.25 = 487.5 manhours lost per week, multiplied by 4.3 weeks per month netted 2096 lost manhours per month "looking for pipe hangers". Using the hourly rate (approximate) of $12.00 per hour, and ignoring the other wage-related costs, the cost to the yard due to this problem was in excess of $25,000.00 per month.

Higher management of the yard was visibly shocked when they learned this information. John proceeded to inform them that the department heads directly affected by this information had received a preliminary presentation of this information the precediig week, and had concurred with the data as presented and had supported the presentation information about to be demonstrated.

The presentation continued by outlining the process they had used to come up with their problem solution. Using the Six Step ProbIem-SoMng Method[1] and the brainstorming techniques learned and practiced in the classroom, the group had

[1] See Appendix E for a complete explanation of the Six Step Problem-Solviog Processs.
[2] Ibid.

offered numerous potential solutions. Upon evaluating the suggested solutions, group consensus had developed what they considered the optimum solution. They decided upon an approach that would address the majority of the problems faced by the pipefitters. The team decided to build a storage bin capable of holding a week's supply of hangers and caps, plus bolts, nuts, and mounting pads. Furthermore, they decided to color code the hangers according to size at the point of manufacture to insure stocking the bin with the proper sizes.

The bin would be constructed with large compartments on the bottom to hold the chair portion of the hanger and smaller compartments directly above which would hold the mating caps. Each of these compartments would be painted with the same color code as the hanger stored within it, thus providing a positive means for controlling the accuracy of the inventory process. Additional compartments would be constructed, complete with sealed doors, to hold the required bolts and nuts and mounting pads. These compartments would be identified by painting the sizes on the doors to the compartments (doors would be required to keep the bolts and nuts from exposure to the elements since they are not painted).

The storage bin would be constructed with identical compartments back to back, so access from both sides would be possible. Additionally, lifting pads and fork lift slots would be provided to insure portability, as required. The structure would be approximately 5‘6” high, by 12’ long, by 3‘6” deep with the capacity to holdup to 10 days supply of pipe hangers.

In addition to the storage bin, it would be necessary to provide a means to transport supplies of hangers to the various work areas aboard the vessel by crane. The team devised a “transporter”, consisting of a central vertical member mounted upon a 3‘ square steel base, the vertical member was a 4‘ piece of 3” pipe, with arms protruding upward at a slight angle, similar to the branches on a Christmas tree. The arms would have a chain welded to the end, and clipped to the vertical riser as a safety device to prevent hangers from falling off during transit. Four of these transporters would be required to maintain an uninterrupted supply of hangers aboard the vessel.

The last item the team needed to complete its solution was a device for the paint department to use as a means to control the accuracy of the coIor coding process. Since pipe hanger sizes are not a familiar item to painters, it was determined that a gauging device should be constructed and placed at the point where the color code would be applied to the hangers. A 2” X 1/2” flat bar with all the chair hangers welded to it, and painted in the color to be coded would be hung at the two paint stations, thus providing a constant system for determining the correct paint color code.

The color code would be applied with an aerosol paint spray to the lower leg portion of the chair hanger, covering about 1-1/2”, and the caps would be painted on the side toward the pipe, to eliminate any compatibility problems with paint schemes in the immediate area where hangers would be mounted. Since the majority of the chair hangers were cropped for sizing during installation anyway, the color code would be removed at this point. What was not removed by shortening the legs during installation would be burned off by the heat from welding the hangers to the vessel.

At this point in the presentation, John paused to allow his team members to comment on their. crafts’ acceptance of the procedures discussed so far. At this time, he also asked the Steering Committee and the invited guests for any comments they might have concerning the solution.

Several technical questions were fielded successfully by the team members, until one Steering Committee member asked what the rigging department thought about the handling methods suggested by the team. At this point, John asked the head of the rigging department to answer this question directly.

The rigging department head explained to the group that the team had approached him two weeks ago with this problem and the projected solution and that he had suggested some safety additions to their solution which had been included in today’s presentation. Additionally, he added that this solution was providing additional benefits, since it would alleviate a great deal of congestion on the 800’ dock which gave his people problems in locating material. He also mentioned that the current methods for loading hangers aboard the vessel were only marginally safe, and that the use of the suggested transporters would not only be safer, but would save him time by reducing the number of lifts required to service the pipefitters.

At this point, John indicated that there was one additional cost item that the team had included which needed to be covered. He said that normally when anew procedure or method was introduced in the yard, the way people found out was to see the new equipment in use or to learn about it after the fact. In this instance, the team wanted to inform all the pipefitters about the problem solution before implementing it, in order to get immediate acceptance of the idea and to field all questions up front to eliminate confusion. The team recommended that alI the pipefitters be called into the meeting room for 45 minutes of presentation and dkcussion prior to implementation, as a means to communicate the success of the EI process and to eliminate all potential confusion about the solution.

Once all the questions and comments had been fielded John turned the pages on his flip charts and proceeded to discuss the cost implications of the solution. His chart showed the following cost information:

Storage Bin	$4,000.00
4 Transporters	1,400.00
Presentation time	1,500.00
Total cost =	$6,900.00
or approx.	7,000.00

Savings of $25,000.00 per month x 4 months left on TAKX = $100,000.00. This would equate to $1,162.80 savings per day, or a total payback of the investment in 6.0 working days.

John then asked the Steering Committee for approval to proceed with the implementation of the solution. The Steering Committee complimented John and his teammates on a very professional presentation and indicated that the solution was accepted with the thanks of management for a job well done. The General Manager asked how long it would take to build the necessary equipment and have it in place so the implementation could proceed without delay. John indicated that in two weeks the solution would be implemented and the orientation complete.

The General Manager complimented the team on the thoroughpess of their solution process and expressed his pleasure about the timeliness of the whole process. He commented that only six weeks had elapsed since the first day of their training and that the results of their efforts over this short span of time indicated the dedication of the team to the process and the problem. He said he hoped that the lesson learned by the cooperation of all involved would spread throughout the yard.

STUDY ACTION TEAM

PROBLEM #1

The Study Action Team (SAT) had been assigned the "global" problem of "Tools and equipment: Maintenance and Availability" as its overall assignment, since this problem affected the whole yard and was not specific to one department. The make-up of the SAT reflected their assignment, in that seven hourly people, one each from electrical, carpenters, shipfitters, welders, pipefitters, machinists, and one tool room repair man, in addition to one salaried person, a civil engineer from the Design Engineering Department made up the team. The team members chose Stuart Reeder, the engineer, as their team leader during the training phase.

During the training sessions the team was able to review the list of problems submitted by the employees to determine which one they would approach as their first attempt at problem solving. Eecause the team wanted to attack a problem with high visibility to the workers in the yard and also wished to get their "feet wet" on a problem of minimum complexity, they elected to rate the problems according to those parameters while still in the classroom phase of training.

The team applied the same rating criterial as used initially to prioritize problems, and by brainstorming[2] the list of problems assigned to them, they decided to work on the problem named: "inadequate facilities for hooking up air-operated tools".

Stuart and the Team researched the problem, and visited the worksite (TAKX conversion located at the 800' Pier) to determine the scope of the problem and the departments affected by the problem.

The initial foray into the yard on an information gathering mission proved to be an enlightening experience to the hourly team members. Not all the personnel contacted were receptive to their requests for information. They found some resistance to information sharing among the department heads and some high level supervision who appeared to resent hourly people asking them questions concerning productivity and tool availability.

The hourly team reported this problem to Stuart, and he immediately contacted those department heads involved and indicated that the Team was seeking out information concerning a problem that affected their departments' ability to perform in a productive manner, and reiterated the fimdamental purpose of the Employee Involvement Process that they learned during the initial phases of the process.[3]

After this initial problem with information sharing, the Team found that information was more readily (if reluctantly) available. In order to avoid the defensiveness encountered with the top levels of supervision, the Team found that the quality and quantity of information available from the hourly people and lower levels of supervision provided them with the data required and, ultimately unless absolutely necessary, the Team did their fact gathering from among this group.

The Team gathered enough preliminary information to make an initial assessment of the distribution of the problem, including what departments would be impacted by resolving the problem. They prepared a flip chart depicting the departments affected along with the varous skills within the department that required access to air power. The chart included the following information:

DEPARTMENT	SKILLS
Welding	arc gouging chipping (slag) tank testing
Hull	grinders
Pipe	pumps (testing) pencil grinders (welders) disc grinders
Paint/Labor	spray paint equipment air line respirators sand blasting equipment pumps (stripping)
Machinists	drills pumps air wrenches

After determiningg the scope of the problem, the Team explored the yard to determine the causes of the problem. Their information gathering uncovered some interesting background information which would be useful in the solution process.

[1]See Problem/Volunteer Selection and Training Section.
'See Appendix E.
[3]See Orientation Seetion.

hipyard practice employed the use of portable air manifolds erected aboard ship at multiple locations on various deck levels. The locations were chosen primarily dependent upon the heaviest use. Normally, the Hull Department and the Paint and Labor Department have the heaviest usage and servicing those crafts is most critical during the bulk of a construction program. The manifolds have up to eight air outlets and the worker uses a common screw-in quick-connecting air fitting to tap the air supply. Normally, the equipment he is using contains one-half of the connector, with the mechanic supplying the other half to connect to the manifold.

A vessel under repair or conversion may have up to 20 manifolds located on various deck levels in each hold in order to minimize the amount of connecting hose required to reach from the manifold to the actual jobsite. Additionally, each fabrication shop in the yard is supplied with air service and each shop had multitudes of outlets utiliziig the same type comector. The outside building ways and platens were also supplied with air and contained connections for the same fitting. In all, approximately 900 air outlets were available throughout tie yard for connecting air tools to the air supply.

Unfortunately, air connections were not issued as standard items along with mechanics tools, so each time a mechanic needed to connect a tool to the manifold he had to travel to the tool room and check out an air connection and return it to the tool room at the end of the day. Since the tool rooms were located a long distance from the work site, this situation caused substantial lost time.

Armed with this information, the team decided that the problem could be totally eliminated by providing the female half of the air connection at all air outlets in the yard. Upon discussing this potential solution with the Maintenance Department it was found that each air comection cost about $7.00 and purchasing new connectors would amount to over $6,000.00. This did not seem to be a feasible resolution of the problem because it was found that 10 years ago aal air manifolds had been equipped with these connectors only to have them removed by mechanics for use at another location.

The Team decided that they must find away to permanently affix air connectors to all the available outlets in the yard, without purchasing a large quantity.

They decided to talk to the hourly people and determine if there could be a large quantity of fittings that had not been checked into the tool rooms. A survey of the large users of air connections uncovered the fact that some of the older employees had indeed been putting aside air connections for some time, so when a need arose for more than one connection, or, if a connection had been stolen, they would have a spare or two available. The team found that this practice had been going on for many years and that some employees had as many as twenty extra air connectors in their personal lockers or in their tool boxes.

The Team then decided that the only way to recover these “stashed” comectors was to offer an amnesty to all holders of extra connectors and provide an anonymous method of returning them to the tool rooms for collection. They decided that through a letter to all employees, discussions with workers by supervision and personal contacts made by the SAT this could be accomplished.

One other factor remained to be resolved. The people had told the Team that they would not return their spare comectors unless they were satisfied that a permanent solution to the air connector problem had been reached and that management had approved implementation of the plan.

The Team proceeded to collect statistical information on the lost time involved in traveling to the tool room for comectors in order to evaluate the costs involved in providing a solution.

The members of the SAT requested interviews with all department heads affected and collected information concerning the number of people who used air connectors and the frequency of use. They next conducted a study of the time required to travel from each major work location in the yard to the tool rooms and recorded round trip times, including the time required to check out air connectors.

The Departments responded with the information requested and the Team began to evaluate the information. The following data was recorded on a flip chart, and the Team began their preliminary cost analysis:

DEPARTMENT	# AFFECTED	TIME LOST
Hull	12	8 hrs/day
Pipe	31	16 hrs/day
Welders	44	16 hrs/day
		Total = 40 hrs/day

There were some differences between the information received from the department heads and the hourly and first line supervision so the team elected to use the more conservative data which dictated using 40 hours per day lost "going to the tool room for air connections”. 40 hours per day x 250 work days per year = 10,000 manhours per year lost traveling to and ffom the tool rooms for air connectors.

The Team now had the basis for continuing with the initial direction of the problem solution. In order to overcome the problem of air comectors being removed from manifolds they had to come up with a cost-effective method of permanently affixing them to the manifolds, a system of maintaining the portable manifolds when removed from worksites to storage areas and a method of retrieving the surplus air connectors in the hands of the employees.

The Team brainstormed these problem sub-sets and ultimately elected to test out an Epoxy cement as a means of semipermanently affixing the female half of the air connector to the manifolds. They contacted the Maintenance Department to determine if such material was available in the yard. Several varieties were available and the Team proceeded to test mount several air connectors to manifolds to see if they could be made pilfer-proof.

They tested four different brands and types of Epoxy cement until they found a variety that would withstand the established parameters for torque resistance. Once this material had been tested and witnessed by Maintenance personnel the Team had

the major hurdle overcome. The next step was to return to the classroom and attack the remaining two pieces of the puzzle, namely, maintenance and connector return.

The last two pieces of the problem were determined using the techniques learned in training and workable solutions to these problems were established. The maintenance procedure was developed around existing methods, but was formally reduced to writing so responsibilities would be clear and understandable. Once a manifold was no longer needed on the construction site it was returned to Maintenance for a serviceability check. If it was found that an air connector was missing, the manifold would be sent to the Pipe Department for replacement of the missing connector. Then the manifolds would be put in the normal storage space by the Pipe Department in a completely serviceable condition and ready to be shipped to the next work site with air manifold requirements.

In order to retrieve the outstanding air connectors in the hands of the employees, the Team determined that an empty 55 gallon drum with the large bung removed could be stationed at each tool room. The employees could drop the connectors in the drum and they would be safe from pilfering until the collection process was complete.

With the solution fairly well in hand, the Team needed a plan to implement it since the costs of implementation would be a part of the justification phase of the problem/solution presentation.

Stuart called a meeting of all departments affected by the solution and senior production management personnel in order to make a preliminary presentation of their solution. A secondary motivation for this meeting was to gather together in one room the people with the authority to approve implementation procedures.

Since most of the department heads and some senior production people had been involved in the fact-gathering phase of the problem, there was almost unanimous approval of the solution. It was decided that the installation of the connectors would be done on a weekend in order to minimize any production interruptions. The pipefitters would install the fittings on the ship and the Maintenance Department would handle the installation of the fittings in the shops, river ways and other yard locations. It was determined that enough fittings were available for the portable manifolds and the collection effort, if successful, would provide the balance of the needs for the remaining outlets.

With the backing of the production people, Stuart and the Team members began preparing their information for the formal presentation to the Steering Committee and the top management of the yard. Several flip charts were prepared, a complete write-up of the solution was prepared and samples of the epoxy cement, as well as a demonstration manifold, were prepared in the meeting room for use in demonstrating the installation procedure and the holdlng power of the intended final installation.

When all the material was prepared, the Steering Committee was notified and the meeting time was established.

The day and time of the presentation arrived and the Team was well prepared. The Steering Committee and the General Manager and his staff were present, as well as the heads of the departments affected.

Stuart presented the problem they had chosen to pursue and the basic statistics supporting the need to correct the situation. He explained the basis for determining the methods chosen for correcting the problem and the testing that the Team had gone through. Team members demonstrated the holding power of the new attachment method and demonstrated the installation technique.

They then turned to the flip chart and began to summarize the forecast effects of implementation of the change. The following information was displayed:

Current Costs: 40 manhours/day x 250 days = 10,000 MH/Year

Cost of Solution Implementation = 250 Manhours[4]

Return on Cost = 10,000/250 or 40:1, or

Payback of investment in 6.25 days!

The General Manager asked the department heads if they concurred with the information presented. The response from the department heads was affirmative since they had supplied the statistics used as the cost basis.

The Steering Committee responded that they felt the solution should be implemented immediately and the General Manager concurred. The Team was delighted with the response. They requested and received permission for work orders to be drawn up to accomplish the required work.

The Team requested that all department heads inform their people about collecting the outstanding air connections and proceeded to draft a letter to the employees informing them of the success of their problem/solution presentation.

The letter was issued and people notified of the collection procedure. Almost immediately air connectors started showing up in the collection drums and in a matter of one week over 200 connectors had been returned. This provided the amount required to complete the majority of the work in the yard.

The change over on the worksite took place the weekend following the presentation and was accomplished in less time than budgeted. The results of this solution were immediately visible to all the employees on the job and were received very favorably.

After 30 days of follow-up on the job not one air connection was missing which served as an indication of the qualhy of effort put forth by the Team.

[4]The materials and labor costs were calculated, then reduced to equivalent manhours so the comparison would be simple to present.

STUDY ACTION TEAM

PROBLEM #2

During the problem submission phasel the majority of problems submitted concerning tools and equipment were those relating to the timely availability and accessibility of special tools frequently required by various crafts. The SAT Team felt that they should address this problem as soon as possible since its solution would have a broad impact upon production and give the Employee Involvement process a big boost.

The Team elected to determine exactly how the current tool room procedures operated in order to find ways of correcting the situation that resulted in' 'lost time going to the tool room for production tools".

Upon employment, each mechanic is issued a basic tool box which contains the essential tools required for normal duties. Any special tools required for particular jobs'must be checked in and out of the tool room on a daily basis. When the tool is issued, a tool room chit is given to the mechanic along with the tool, and, at the end of the day, the tool is returned and the chit destroyed.

At the time the SAT began its work on this problem, the Yard was in the midst of a significant effort involving the reconstruction of two foreign flag vessels into U.S. flag vessels for use in the U.S. Navy's Maritime Propositioning Ship Program. On foreign flag vessels metric sizes are the rule rather than the exception. Accordingly, additional metric tools were needed by most of the tradesmen. This situation resulted in a substantial amount of lost time going to and from the tool room during working hours checking out these and other tools.

The Team determined that the problem required discussions with a representative sampling of the hourly employees involved in-the problem and with the heads of their departments. Several assignments were given to team members covering the basic points of information required for further evaluation of the problem

a) Two members were assigned to determine the average length of time required to travel from the work place to the tool rooms, including the time necessary to checkout tools and return to the active worksites.

b) Four team members were assigned to interview employees in the various crafts to determine the frequency of trips to the tool room and the types of tools checked out.

c) The remaining team members were to interview department heads and supervision to insure that all aspects of the problem were being considered.

The major issues needing input from the production departments were:

a) The number of people who checked out tools.

b) Frequency of the need for checking out tools by the group in a) above.

c) Departments with high requirements for tool check out.

d) Specific details concerning the actual tools checked out (type, size, etc.).

e) System or procedures which affect these check outs and potential for changes to simplify task.

Once this information was collected and evaluated by the Team they could identify the specific approaches for producing a preliminary solution.

The data collection took about two weeks and, at the end of this period, the Team had gathered all the necessary information, qualified it by cross checking information with tool room records and by discussing the data with various supervisors and department heads in the yard.

The Team now felt they were ready to present their findings along with a prelimimny solution to senior production management in the yard and to solicit their collective opinion of the quality of their conclusions.

Stuart requested a preliminary presentation meeting with the department heads affected by the decision as well as the senior ship superintendents and tool room management.

With the experience of his first presentation behind him[2], Stuart had the visual aids prepared and all the significant data typed and in the form of preliminary hand outs for the guests. As he stood in front of the group of production managers, he sensed an atmosphere of tension and possibly some hostility on the part of the people ready to hear the presentation.

Stuart began by introducing the Team members to the group and having the guests introduce themselves. After the introductions, he explained why the Team was working on the problem of "tools and equipment availability" and explained that a large number of hourly employees had complained about the lost time going to and from the tool rooms for tools on a daily basis. He also indicated that substantial production time was lost because of this extensive travel away from the job during production hours.

He immediately received response from the invited guests who were not inhibited by the presence of any senior management people in the room. Some of the production people volunteered that the problem was not that great and that it had been highly exaggerated. Others volunteered that it had always been that way and couldn't be changed. Still others said that you couldn't "buck the system".

When the responses quieted down, Stuart remarked that the same thoughts had been expressed by the Team members until they had explored the problem and its consequences. He went on to explain that the Team had researched the extent of the problem and felt that because of the size of the problem, they could provide alternatives.

Stuart then turned to the flip charts at the front of the room and displayed the details of the problem. The chart had listed the departments, number of people affected, and the amount of lost time resulting from the current methods as follows:

We Problem/Volunteer Selection and Assignment Section.

[2]See Study Action Team Problem #1, this section.

DEPARTMENT	# AFFECTED	LOST TIME/DAY @3)
Welding	57	47.5
Electrical	8	6.3
0/S Machinists	20	15.0
Carpenters	25	13.3
Hull:		
Fitters	78	78.0
Grinders	11	8.25
Pipe	60	41.0
		Total 209.0 hrs/day

Stuart then added that this data reflected 50,000 manhours per year lost time, a situation that demanded corrective action.

The guests were visibly impressed with the analysis and were ready to discuss the Team's remedy.

Stuart indkated that the Team had suggested as a solution that a portable tool room be constructed and stocked with the necessary tools and be placed at the site of the major work in the yard (800' Pier).

He suggested that a small building approximately 12' x 16' would be adequate to house all the necessary tools and also be large enough to allow a toolroom keeper to occupy the building.

The Foreman of the Welding Department volunteered that he had an extra welding rod storage building of the desired dimensions that he could donate if the Team could locate some storage space elsewhere in the yard. He said that the cost for modifing the building would be far less than constructing a new facility and would also speed up the availability of the portable tool room.

Stuart indicated that the Team would check into the building in question, determine the cost for renovation and use it as the cost basis for implementation of the solution.

The guests were then asked if they found any problems with the cost data or the suggested solution. Suggestions were made concerning construction procedures which shotdd include padeyes for lifting and access ladders for attaching lifting chains. Additional suggestions were made to insure that the cost for stocking the building would be included in the implementation cost.

The guests then complimented the Team on the thoroughness of their work and wished them success in their final presentation to upper management.

The Team next developed the design of the building and researched what tools would be needed for stocking the portable tool room. They took their designs to the construction departments and requested quotations on the necessary modifications which would be used for the cost basis for their solution presentation.

With all the necessary information in hand, the Team began preparing the formal write-up of their solution and implementation plan which they would distribute to the Steering Committee and invited guests prior to the formal presentation. Additionally, they prepared visual aids for presentation purposes and prepared the meeting room to receive the invited guests.

Stuart then requested the EI Staff to contact the Steering Committee and request a time for the presentation.

The day of the presentation arrived, and the guests arrived at the appointed time. The General Manager and his staff, the Steering Committee and selected Department Heads were present.

Stuart had been selected by the Team to make the presentation since he was now experienced with the presentation techniques, having presented the solution informally to the yard supervision. He began the presentation by describing the problems submitted by the employees and the investigative work done by the Team confirming that substantial lost time occurred going to and from the existing tool rooms for tools on a daily basis. He presented the graphic information detailing the cost to the yard in manhours (209 manhours per day), and went onto describe the solution which was to construct a portable tool room to be located at major construction sites.

He summarized his presentation by presenting the final economic justification:

Current costs — 200 manhours/day x 250 days = 50,000 manhours/year

Solution cost = $1,500.00 + 300 manhours or 425 manhours

Payback period assuming 100% effectiveness = 425/200 or total payback in slightly more than 2 days!

Stuart went onto indicate that there would still be a need to travel to the tool rooms by some employees for special tools or tools which could not be stored in the new portable tool room. Still, he remarked, if the solution is only 50% effective the payback would still take less than one week.

Since one of the yard tool rooms could be closed down, he noted that there would be no additionrd cost to man this new tcd room. All that remained was for management to determine if the solution and implementation plan, as submitted, could be justified on the basis of the information collected.

The Steering Committee and the General Manager and his staff consulted for a few moments and then made their recommendations. They said that they wanted this solution implemented immediately and that they wanted the SAT to do the actual work on modifying the building to insure that the work was accomplished in the manner they described and in the time frame that would maximize the savings from this solution.

The Team was issued a work order and the authorization to procure the needed materials and began the work to modify the tool room. Within 6 working days the tool room was modified, stocked and on-site, ready for use. The solution proved to be very popular with the employees and was visible evidence of employees having a voice in providing productivity improvement ideas to management and receiving management backing.

SECTION VIII

SUSTAINING THE PROCESS

The nature of the Beaumont Yard Employee Involvement process featured two characteristics which placed special demands upon those people facilitating the process. Those elements were:

1. Rapid problem solutions (results orientation)
2. Self-destructing teams[1]

Rapid problem solutions: The task and purpose of the Employee Involvement process were to provide productivity improvements which would have immediate effect on yard operations and help put the Yard in a more competitive position in the industry. A further motivation for rapid problem solutions was a need to prove to the employees that EI would work for them and that the visible evidence of problem solutions being implemented would help sustain the process.

Self-destructing teams: The purpose for using self-destructing teams was to provide an opportunity for all employees wishing to become involved to do so. It was felt that within the constraints of a limited budget the program would "pay as you go" with each team contributing to the success of the process and providing the impetus for training and forming new teams. In this fashion, all those employees with a desire to participate could become part of the effort without the need to train the whole yard at once.

Also, with the knowledge that they would one day be part of the effort, the team rotation method prevented the "ins and outs" atmosphere that often pervades a system where teams are permanent and only a select few participate in the process.

A. FACILITATORS: Facilitation of the teams' efforts from their inception was an absolute necessity given the parameters of the process. Since teams met for two hours per week, off the job, in a classroom, it was necessary for at least one of the facilitators to be in attendance throughout each team meeting.

Because of the emphasis upon rapid problem resolution, the facilitators provided direct assistance to the teams supplying the needed outside resources necessary for data input to solutions. This freed the teams up to concentrate on their classroom and on the job site fact gathering. The facilitators provided scheduling and marshaling of technical and administrative assistance and set up all informational meetings for the teams.

All correspondence, internal and external, was provided by the EI Staff (facilitators). Because there was a full-time team meeting daily (The Study Action Team) additional challenges were thrust upon the Staff since at least two, and most times four hours, per day were spent with either classroom facilitation or on expediting resources for the team.

The EI Staff usually provided the graphic presentation expertise for formal presentations since those skills were not always available internally to the teams. Additionally, the Staf provided guidance concerning statistical methods for fact gathering and presentation and acted as the "devl's advocate" when reviewing data gathered for solution presentations.

Yard communications, including the Employee Involvemen Newsletter, aperiodic news publication used to update the employees on the latest EI developments, communications with the consulting firm and any other internal or external communications were handled by the EI Staff.

B. INFORMATION GATHERING Initially there was some reluctance on the part of the hourly team members to approach management during the fact-gathering stages of problem solutions. Usually, after one such trip this problem disappeared and, as they gained experience, they became excellent interviewers.

Some problems developed with supervision and some middle managers as the process matured. Because of the quality o the problem solutions, and the uncovering of much inefficiency within some departments, some managers were reluctant to make full disclosures of data required by teams. This circumstance provided a challenge to the team members and they would then dig deeper until they received the necessary data, usually from alternate sources. The "turf protection" syndrome was never fully dissipated during the process. A few supervisors and a few middle managers remained aloo to the Employee Involvement process and at best gave "reluctant" support.

In the quest of problem solutions, one technique was consistently applied with great success. Early in the development of the EI program when a team felt they had a sound basis for a problem solution, but had not gathered all the supporting information, they called in the supervisors and as many of the affected middle management as possible to critique their progress. This method brought to the group a small number o management people with a great deal of experience with the particular problem, and once they learned the quality of the effort the teams were putting forth, they became very interested in the solution and provided invaluable information and help in resolving the issue. Additionally, once they became committed to the problem solution, they became an important asset, supporting the final solution. They had "bought in" to the solution and thus became "stake holders" in the process.

C. PRESENTATIONS When all the facts had been gathered and marshaled into an effective presentation, the Staff called a presentation meeting with the Steering Committee. Usually, the Steering Committee would invite top

When a team solved its problem it was dissolved and replaced by a new team with a new problem.

management. The team would request that the leaders of the departments affected by the problem solution be in tendance.

Because of the training received by the teams and their supporting staff the formal presentation of problem solutions was done in a very professional manner. The teams looked forward to "presentation day" as a major occasion and this was reinforced by the importance placed on problem solutions by management. The presentations made by the Employee Involvement Teams were some of the best, well planned and professionally executed that had ever been done at the Yard.

D. PROCESS RESOURCES: Invaluable to the Employee Involvement process at the Beaumont Yard, the Steering Committee proved to be the catalyst that kept the process together. The Co-chairmen of the Committee seemed to be involved in some part of the process almost on a daily basis and really assisted in smoothing out the process. Whenever resistance was encountered from members of production management, or elsewhere in the organization, members of the Steering Committee could be counted upon to smooth the way for Employee Involvement.

The consultants provided the third party expertise necessary to initiate and sustain the process. They were always available for guidance and provided excellent on-site facilitation assistance. When road blocks occurred, they had the ability to negotiate resolution of matters that could not be handled internally. When the process seemed to slow down, they had the ability to "light fires" under those involved and revitalize the effort.

Early in the process the consultants indicated that ultimately they would not be necessary to the process, since they would impart all the training on the local staff necessary to sustain the effort. This proved to be true as it related to day to day activities. However, the short duration of the Employee Involvement Process at the Beaumont Yard put the consultants in the situation where they assisted in the phase out of the process as business conditions deteriorated.

E. ENDING EMPLOYEE INVOLVEMENT (TEMPORARILY): Because of a rapid decline in business, layoffs among the hourly workforce began four months into the Employee Involvement effort. When this situation became evident, teams that had solved their problems disbanded and were not replaced. Finally, the Study Action Team was the only team operating when the last force reduction came. At that time, the SAT was dissolved and the EI effort was temporarily suspended.

Prior to the first team layoffs, a "thank you" luncheon was held, and the General Manager addressed all participants conveying the thanks of the Company and certificates of participation were given to those present.

SECTION IX

RECOMMENDATIONS

Based upon the experience gained through participation in Employee Involvement at the Beaumont Yard the following recommendations are made:

1. The partnership with the Union in the EI process proved to be a major factor in sustaining the process. Union leadership attended Team training sessions, management orientation classes and Team meetings. They were active supporters of the process and helped reinforce commitment to Employee Involvement. A full partnership with the unions in any effort of this type is recommended.

2. In an effort to obtain a broad representation on the Planning and Policy Council, 16 members were chosen, eight Union, and eight Management. It became exceedingly difficult to bring this number of people together at the same time because of schedule conflicts. A recommendation for a smaller number, very highly placed in their organizations, is made.

3. The Steering Committee should have strong dedicated people from management. The management members should have a strong manufacturing or technical background and be highly placed in the organization. The Union members should be chosen on the basis of their ability to rationally support changes that are proposed and to provide a balance with the management members. The Beaumont Yard process had the people as noted above and was successful as a result.

Because Employee Involvement Steering Committee membership thrusts union members into a delicate decision-making posture, one with which they may be unfamiliar, and one which can be intimidating even to someone with experience, it is recommended that the choice of Union Steering Committee members be given serious thought. Management Steering Committee members may have a tendency to intimidate and thus inhibit a balanced approach to problem solutions. It is critical that the Union Steering Committee members participate equally with their management counterparts.

4. The Beaumont Employee Involvement process, designed for problem solutions developed in a classroom setting and working essentially outside the mainstream of Yard activities, would be difficult to sustain over an extremely long period of time. Once the obvious problems have been solved and the easy solutions are gone, maintaining a high level of enthusiasm would be extremely difficult. The Beaumont process was designed to bring in as many people as possible to the program and to begin to implement the more challenging phases of Employee Involvement, such as: Multi-craft Work Groups or Semi-Autonomous self-managing work groups, employing some of the latest production control developments, including accuracy control techniques. Additional options must be available to sustain the effort over a long period of time.

5. The last recommendation is by. far the most important to the whole process. There must be absolute top management support for the process if it is to succeed. This support must be visible, active and more than mere words. It must be sustained by showing up for problem-solution presentations, written in company communications and spoken often in staff meetings. The message must be delivered with consistency. Without this support, the effort is doomed.

APPENDIX A

BETHLEHEM STEEL CORPORATION

BEAUMONT YARD

MEMORANDUM OF UNDERSTANDING

EMPLOYEE INVOLVEMENT EXPERIMENTAL AGREEMENT

The strength and effectiveness of an industrial enterprise in a democratic society requires a cooperative effort between labor and management at several levels of interaction. The parties hereto recognize that if Bethlehem's Beaumont Shipyard employees are to continue among the best compensated shipyard employees in the world and if Bethlehem's Beaumont Shipyard is to continue to meet domestic and international competition, the parties must pursue their joint objectives with renewed dedication, initiative and cooperation.

Collective bargaining has proven to be a successful instrument in achieving common goals in the employment relationship between Bethlehem's Beaumont Shipyard labor and management. However, there are problems of a continuing nature at the level of the worksite which significantly impact that relationship. Solutions to these problems are vital if the quality of work life for employees is to be enhanced and if the proficiency of the business enterprise is to be improved.

The parties recognize that a cooperative approach between employees and supervision at the worksite in a department or similar unit is essential to the solution of problems affecting them. Many problems at this level are not readily subject to resolution under existing contractual programs and practices, but affect the ongoing relationship between labor and management at that level. Joint participation in solving these problems at the worksite is an essential ingredient in any effort to improve the effectiveness of the Company's Beaumont Shipyard and to provide employees with a measure of involvement adding dignity and worth to their work life.

In pursuit of these objectives, the parties believe that the Local Unions and Management at the Yard can best implement this cooperative approach through the establishment of Employee Involvement Teams of employees and supervision in departments or similar units at the Yard. Accordingly, it is agreed that the following experimental progmm will be undertaken with respect to Employee Involvement Teams:

(a) Yard Management and the Metal Trades Council, the Pipefitters, and the Machinists Unions will determine the date during the term of the Basic Labor Agreement on which the process covered by this Experimental Agreement shall commence.

(b) An Employee Involvement Committee will be established in the Yard consisting of appropriate members of Yard management and the Metal Trades Council, the Pipefitters, and the Machinists Unions, to coordinate the activities of the Employee Involvement effort at the Yard. An Employee Involvement Team will be made up of a Management Co-Chairman, and Employee Co-Chairman, and Employee and supervisory members of the department or unit. Employee members and supervisory members need not be equal in number, and may be rotated periodically to permit broader employee involvement. Team members will be volunteers from among the employees of a department or unit and such members will choose their Employee Involvement Team Co-Chairman.

(c) The Yard management shall select a person to be designated as a Management Employee Involvement Coordinator. In addition, the Metal Trades Council, the Pipefitters, and the machinists Unions shall select a person to be designated as a Union Employee Involvement Coordinator. These two coordinators shall be jointly responsible for training, administration and communications related to the Employee Involvement Process and shall report to the Employee Involvement Committee Co-Chairmen on all matters pertaining to employee involvement activities.

(d) Each employee member of an Employee Involvement Committee or Team shall be compensated for time spent away from work in Committee or Team activities at the member's hourly base rate of pay plus applicable COLA.

(e) Employee Involvement Team meetings shrill be called by the Co-Chairmen during normal working hours as often as the team members agree. An Employee Involvement Team shall be free to discuss, consider and decide upon proposed means to improve department or unit performance, employee morale and dignity, and conditions of the worksite. Appropriate subjects, among others, which a Team might consider include: use of production facilities, quality of products and quality of the work environment, safety and environmental health, absenteeism and overtime, contracting out, energy conservation and transportation. The Employee Involvement Committee and the Employee Involvement Teams shall have no jurisdiction over the initiation of, or the processing of complaints or grievances. The Employee Involvement Committee and the Employee Involvement Teams shall have no authority to add to, detract from, or change the terms of the Basic Labor Agreement.

(f) An Employee Involvement Team shall be free to consider a full range of responses to implemented performances improvement, including but not limited to bonus payments.

(g) The Employee Involvement Experimental Agreement shall remain in effect from year to year during the term of the Agreement unless the Metal Trades Council, the Pipefitters and the Machinists Union shall cancel their participation in the program by providing the Management with thirty days notice of cancellation.

APPENDIX B

CHRONOLOGICAL LISTING OF EMPLOYEE INVOLVEMENT EVENTS

08-82 Memorandum of Understanding attached to Beaumont Labor Contract.

03-83 Employment upturn justifies preliminary discussions concerning LMPT; Unions decline.

05-83 Beaumont Yard represented at National Workshop on Social Technologies in Shipbuilding held at MITAGS in Maryland.

06-83 VP/MCG to Beaumont to discuss LMPT concepts with Union Business Agents.

09-83 VP/MCG meets with Union Business Agents, tells them that BSC will proceed with LMPT. Unions agree that BSC select an external consultant.

11-83 Beaumont top management attend LMPT seminar at Bethlehem, Pennsylvania, for an update on Corporate LMPT progress. They visit Sparrows Point Shipyard and attend a "problem-solving team" meeting.

BSC screens potential LMPT consultants and submits list to Beaumont Yard.

Beaumont Yard interviews potential candidates and selects Cornell University group.

12-83 Beaumont agrees on an approach developed by Dr. Peter Lazes of Cornell. Lazes meets with representative of all nine Shipyard Unions; they agree to accept him as the external consulting firm.

01-84 Cornell Consultants visit Beaumont Yard for initial LMPT "Readiness Assessment". Discussions held with both management and unions.

02-84 Letter to employees, co-signed by Beaumont General Manager and Unions discussing progress to date and plans for the future.

Cornell Consultants conduct interviews with 20% of the Beaumont Yard work force (salaried and hourly) in order to determine the necessary type of intrerwention.

03-84 "Organizational Assessment" report presented to the Beaumont Yard management with summary and analysis of 234 interviews conducted in February.

04-84 Beaumont Management meets "off-site" for three days where 20 members of upper management reviewed progress to date and agreed on a suggested course of action for the future.

Key decision was to postpone implementation of multi-craft teams and self-governing work groups. Letter to employees from General Manager outlining "off-site" decisions.

07-84 Union-Cornell "off-site" meeting held.

08-84 Initial meeting of Labor/Management Policy and Planning Council held jointly with Cornell Consultants to plan detailed activities and procedures.

Union President and Beaumont Shipyard Industrial Relations Manager selected as co-chairmen.

Letter to employees from co-chairmen outlining council decisions.

09-84 Employee Involvement (H) Director, EI Specialists (full-time), Steering Committee all nominated and agreed to by unions and management.

EI Specialists attend LMPT-EPG training at Home Office in Bethlehem, Pennsylvania.

10-84 Letter from Policy and Planning Council co-chairmen announcing EI Staff to all employees.

First local training of Staff and Steering Committee by Cornell group.

11-84 Continued training by Cornell for Staff and Steering committee.

EI Specialists attend Second National Workshop on Human Resources Innovation in Shipbuilding at MITAGS and present progress to date.

12-84 Planning and Policy Council meeting to review progress and to agree upon details of further development.

Supervisory orientation to make all members of management aware of the implications and effects of new LMPT/EI policies.

Letters to all employees bringing them up to date and soliciting problems and volunteers for process.

01-85 Problems received, evaluated and prioritized by EI staff.

Volunteers screened, cleared through production management.

All problems submitted, discussed with department heads to determine if any could be solved locally instead of through problem-solving teams.

02-85 EI Staff present 19 problem sets with recommendation to Steering Committee.

Steering Committee prioritizes problems, selecting seven of nineteen as initial thrust.

Steering Committee selects problem-solving team members for Employee Involvement Teams (EIT's), and Study Action Team (SAT). Selections based upon needs presented by problem set.

Training of EIT-SAT begins (3 days -8 hours per day).

03-85 EIT-SAT begin work on problem-solving, holding two hour per week meeting "off-the-job". SAT Team meets reg.darly 8 hours per day, 5 days per week, addressing large multi-faceted problems.

04-85 Pipe Hanger Team presents problem solution.

SAT Team present Air Connection Problem Solution.

Steering Committee meets to evaluate progress.

05-85 Materials Team presents Welding Electrode Solution.

Day Shift Materials Team presents "Pipe Materials" problem solution:

SAT Team presents "Tool Availability" solution.

06-85 Safety Team presents "Foot Injury" solution.

Testing Team presents "Testing Solution".

EI Staff and Beaumont Yard Assistant General Manager attend PS-5 meeting in Chicago and give progress-to-date presentation.

07-85 Awards luncheon; diplomas presented to EIT and SAT Teams, EI Staff, Steering Committee. General Manager thanks each employee for effort-to-date.

Declining order backlog and reduction in workforce requires reduction in EI effort.

EI Teams dissolved as problems are solved. SAT Team continues to work on their probIems, and follows up on solutions of EI Teams.

08-85 SAT Team dissolved as Labor Contract expiration approaches and immediate future is unclear. Employee Involvement Program is temporarily suspended, pending upturn in workload.

APPENDIX C

LISTING OF UNIONS REPRESENTING BEAUMONT YARD HOURLY EMPLOYEES

Local No. 753
United Brotherhood of Carpenters and Joiners of America
Beaumont, Texas

Local Union No. 390
International Brotherhood of Electrical Workers
Port Arthur, Texas

Local No. 587
International Brotherhood of Boilermakers, Iron Shipbuilders, Blacksmiths, Forgers and Helpers
Orange, Texas

Local No. 243
Painters and Allied Trades
Beaumont, Texas

Local Union 920
Teamsters, Chauffeurs, Warehousemen and Helpers of America
Beaumont, Texas

Local 395 of District 31
International Association of Machinists
Port Neches, Texas

Local No. 195
United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada
Beaumont, Texas

Local No. 450
International Union of Operating Engineers
Nederland, Texas

Local No. 853
Laborers International Union of North America
Port Arthur, Texas

APPENDIX D

SUMMARY OF PROBLEM-SOLVING TEAM RESULTS

EMPLOYEE INVOLVEMENT TEAM PROBLEMS AND SOLUTION RESULTS

TEAM	PROBLEM	SOLUTION RESULTS
#1	Pipe Hanger Availability	Saved 25,000 manhours/yr
#2	Welding Rod Availability	Saved 12,500 manhours/yr
#3	Pipe Materials temporary storage	Saved 33,000 manhours/yr
#4	Foot Injuries	6,250 manhours/yr[1]
#5	Craft Scheduling	Problem not solved
#6	Testing Procedure	Problem solved— no economic justification required[2]
SAT	Air Connections	Saved 10,000 manhours/yr
SAT	Tool Availability	Saved 50,000 manhours/yr
Total program saved approx.		130,000 manhours/yr[3]

The program results summarized above were based on savings calculated with the assumption that a 1,000 man workforce would be in place for a full year after implementation of the individual solutions. These conditions did not evolve since the Yard workforce was utlimately reduced to about 100 employees by the end of September 1985.

Since most of the solutions were implemented during April and May of 1985, the Yard did enjoy the full benefits of the Employee Involvement problem solutions for at least four to six months.

APPENDIX E

PROBLEM-SOLWNG TECHNIQUES

A. Brainstorming Solving problems in groups is based on the premise that collective thinking is often more powerful than individual thinking. An excellent technique for generating original ideas in a group is called Brainstorming. The objective of Brainstorming is to rapidly generate a large number of ideas using the group's creative thinking. The more ideas the group comes up with the better. With many ideas to choose from, the possibility that high quality ideas will result increases.

The key to successful Brainstorming is the notion of' 'suspended judgment". This means that no one is allowed to criticize or comment on anyone's ideas as they are mentioned, no matter how unconventional or offbeat an idea might seem. Instead, evaluating ideas is held off — or suspended — until later. During a Brainstorming session, it's important that people feel free to contribute whatever ideas come to mind. Only after &l possible ideas have been listed on a flip chart and then clarified are ideas judged for their merits or shortcomings. If ideas are received in an open, nonjudgrnental atmosphere, members will be more likely to share ideas that they have not yet fully developed.

For best results, the following ground rules should be followed during group Brainstorming sessions:

'Solution not implemented by management.

Solution was a reorganization of Yard testing procedures.

3Total does not include Item #4.

- No criticism or judgment of ideas is allowed!
- Be creative — encouraging offbeat or far-fetched ideas may trigger more practical ideas.
- Brainstorm as many ideas as you can.
- Combine and build off the ideas of others.
- Write all ideas clearly on a flip chart.
- Number ideas for easy reference.

B. 6 Step Problem-Solving Process: The Six-Step Problem-Solving Process provides a systematic procedure for identifying, analyzing and solving all types of problems we encounter at work or in our home life. Experience shows that problems are easier to solve, and the results more successful, when problems are approached in a systematic and logical way.

It's best to think of the process as an overall guide or "roadmap". It points the way for tackling difficult problems in an orderly, step-by-step manner.

A problem exists when something has gone wrong. When viewed positively, a problem is really an opportunity to turn a bad situation into an advantage by making needed improvements in work methods and practices. A problem may very well turn out to be a blessing in disguise.

Following is a breakdown of the 6-Step Problem-Solving Process as it was used in the Beaumont Yard Employee Involvement training and in the actual solution process in the yard:

Step 1: Identifying the problem is the most critical step of the problem-solving process. Starting off on the right track by developing a clear and accurate statement of the problem is essential if the problem is going to be solved successfully. Several traps await the unsuspecting problem-solver in Step 1: jumping to conclusions about what the problem is; defining the problem in terms of a solution; writing a vague or generalized problem statement. Being aware of these common pitfalls will help members of a group avoid getting sidetracked as they begin investigating their problem in more depth.

Step 1 is completed when an objective problem statement has been developed. Try to state the problem as precisely as possible. Clearly specify what it is you're trying to improve. Think of the problem as an "undesirable condition to correct". Focus efforts on developing a concise, single-sentence statement of the problem with which everyone in the group can agree.

Step 2 is the fact-finding phase of the 6-step problem-solving process. It is here that the problem situation is closely examined to identify the basic causes underlying the problem. Questions such as "What stands out about the problem?" "What information do we have now?" "What additional information do we need?" "How can we best obtain this information?" should guide the group's efforts during Step 2.

As they begin analyzing their problem, they organize their investigative activities into a team project. Carefully planning data collection tasks, responsibilities and time frames will keep their problem-solving efforts coordinated and on track. It is essential to bring an open mind to the investigation. Question any assumptions being made about the problem and its causes. Make sure they are not unconsciously fitting the facts to a preconceived view of what the problem is. Talk to people involved. Get their opinions about what might be causing the problem. Conclude this step by reaching a group consensus about what the problem is and its principle causes.

Step 3: After thoroughly analyzing their problem in terms of causes and effects, it's now time to begin thinking of potential solutions. Before proceeding, briefly review and discuss the results from the information gathered in Step 2. A quick summary of this data will help keep the group on the right course as they begin the search for the best solution to the problem.

The objective of Step 3 is the generation of solution alternatives. Don't worry about judging how workable an idea might be at this point. Just try to come with as many solution options as possible. Consider all possible avenues for solving the problem. Don't stop coming up with alternatives even if a good idea has already been suggested. Resist the temptation to go with the first solution that seems workable. The more ideas to choose from, the better the chances are of coming up with the best solution to the problem.

It's important when Brainstorming possible solutions to create a supportive group climate that encourages all members to express their ideas, even if not fully worked out. Hold off all evaluative comments until Step 4. That's the time to consider the merits and shortcomings of each idea.

Step 4: After Brainstorming a list of potential solutions, they're ready to decide which option, or combination of options will best solve the problem. Step 4 consists ot? (1) selecting the best solution to the problem; and (2) developing a plan to implement the solution and evaluate its effects.

To make the final choice easier, start by drawing up a list of key criteria or requirements against which to measure each solution option generated in Step 3. Then discuss the pros and cons of each option, using these criteria as a yardstick. Instead of discarding options which don't fully measure up to the criteria, look for ways to combine the best parts of several ideas to make an even better alternative. Base the final decision on how well the option selected meets the criteria established for a high-quality solution.

Once group consensus has been reached on the best solution, develop a preliminary action plan for putting the solution to work and how people affected might react to changes being introduced. Be sure to include in the action plan a strategy for monitoring and evaluating the effectiveness of the solution once it is implemented.

Step 5: This step consists of finalizing and carrying out the action plan developed in Step 4. Having an action plan organizes the specific tasks, assigned responsibilities, and completion dates necessary to successfidly put the solution in place. Effective implementation of a group's action plan is essential if recommended changes are to take hold and gain acceptance. Good communication as to the purpose of the changes being introduced, and how those changes will benefit people affected, is also important if changes are to be favorably received.

As a team goes about introducing changes in the work area, it should be sensitive to the impact those changes will have on others. Make sure everyone understands what the group is trying to accomplish. Get their ideas on how to make the solution work better. Involving people affected by changes will help insure greater receptivity and commitment on their part.

Finally, be prepared to make needed modifications in the action plan as circumstances warrant. Anticipate possible problems that might be encountered as changes are implemented. Forward planning here can make the transition from the old way to the new way smoother and less disruptive.

Step 6: Evaluating a solution's effectiveness is necessary to determine if the solution has successfully solved the problem. At times it is difficult to predict exactly what impact a solution will have before actually trying it out. Continuous tracking and monitoring provides the needed data to determine if real progress is being made as planned in solving the problem.

Unfortunately, evaluation is the most neglected step of the problem-solving process. Many groups, anxious to move on to the next problem, often assume mistakenly that putting a solution in place automatically means that the problem is solved and will stay solved. No problem is really solved until the solution is permanently integrated into existing work routines. Constant attention and follow-up is required to insure that the solution is being used by people in the work area.

APPENDIX F
DISCUSSION PAPERS

PAPER NO. 1 SUBMITTED BY J. B. "HANK" GERLACH, MARE ISLAND NAVAL SHIPYARD

The perseverance that carried the problem-solving team (study/action team) effort through to fruition represents a commendable effort by both management and labor at the Bethlehem Beaumont Yard. The ability to maintain momentum in this collaborative venture during the conditions described (i.e., foreign competition, reduced offshore drilling, workload reductions, etc.) represents a sizeable step forward and a growing maturity in the labor-management relations that ultimately evolved at the Yard.

The classic environment that nourishes human resource innovations was not apparent at the Beaumont Yard during the life of this project. For this reason, it is not readily understood why the' 'interventions" suggested to address issues identified in the "up-front" assessment of the organizational climate of the company included three separate initiatives: (1) multi-craft self-managing work groups; (2) single department, self-managing work groups; and (3) study/action teams. Of the three, study/action teams (problem-solving teams, including quality circles) had been achieving varying degrees of success in many industries at that time, while the jury was still out on multi-craft and self-managing work group concepts; especially as applied to adversarial labor-management conditions as described in the report. Because of the probable success provided by the study/action team approach, it alone should have been proposed and pursued at the start, reserving the multi-craft and self-managing work groups for a time when a more mature labor management condition existed; and if/when a more solid workload picture evolved.

The report provides an overview of the typical hurdles to be overcome when embarking on a program such as this. Although expediency appeared to be the order of the day, it is suggested that the time required from "idea to implementation" of the participative management concept at Beaumont (1982-1985) was excessive. The fact that it did ultimately bear fruit again is a tribute to the tenacity of the parties involved. Once implemented, the problem-solving teams achieved almost instant success in their study efforts. Considering the state-of-the-art of team problem-solving "technology" that exists today, a program such as that implemented at the Beaumont Yard might be achieved in something less than a year's time; with due consideration for the varied work environments that now exist in many companies.

The techniques and case studies described in the report generally represent the classic procedures now in use where problem solving teams (and quality circles) are being successfully employed. While the provides provides both tangible and intangible rewards to a company, a step often overlooked is to insure that any cost savings achieved is factored back (institutionalized) into the budget/did process for future work. This is especially true if one of the major goals is to improve the competitive posture of the company. This step was not clearly identified in the report, but should be considered when planning the process.

Bethlehem Beaumont has proved that the team problem solving approach can work, even under less than ideal conditions. Although the implication is that participative management represents "an idea whose time has come" too late at Beaumont (which remains to be seen), it is working in companies throughout the country, and can be successfully applied with proper planning and where a mature labor-management and cultural environment is maintained.

PAPER NO. 2 SUBMITTED BY GREGORY L. SCHWEI, INTERNATIONAL FEDERATION OF PROFESSIONAL/TECHNIC& ENGINEERS, LOCAL 25, VALLEJO, CA

Congratulations to Bethlehem - Beaumont Yard for their brave venture into employee involvement/participatory management. Author K. Smith performs a creditable task in providing a chronology of employee involvement at Beaumont. The author of the report commences with a quote from Victor Hugo (must have been a Union man). Unfortunately the quote portends the swan song of Beaumont as opposed to a new beginning. What is missing from the Beaumont experience is “lessons learned”.

The primary “lesson learned” should have been employee involvement/participatory management is an’ ‘all-or-nothing” adventure. The Union needs to be totally involved with management in the decision-making process. The Union is not the "white-man’s burden” of management. This attitude toward the Union is evidenced in the chronology. 18m elapsed from the Memorandum of Understanding (Aug. 82) to the Union-management letter to employees (Feb. 84). The philosophy of Workplace Systems, the consultant, is employee involvement needs full participation by the Union to be implemented in the workplace. Management needs to present employee involvement as a "win-win” situation to the Union. Management also needs to recognize employee involvement is part of total Union participation in the workplace.

The next example of the timid approach to Union participation is another 6m elapsed until the Labor/Management Policy and Planning Council evolved at Beaumont (Aug. 84). During this time management alone made the decision to initiate problem-solving teams. Also management alone sends a letter informing employees of the management decision.

Management finally gets down to the “deckplates”; yet, another 5m have elapsed, when supervisors and stewards are trained (Jan. 85). 29m have passed since the Memorandum o Understanding was agreed by the Parties in Beaumont — ele phants take 24m.

As the Beaumont experience is a source of “lessons learned”, it would have been helpful if there was better deline ation of the rating system. Author K. Smith delineated: train ing, teams-in-action, chronology, and problem-soIving techniques. A "walk-thru” of the priority rating system by th author would be welcomed by this discusser.

An exception is taken to the fourth recommendation of th author. In part the author feels enthusiasm would be difficul to maintain in the workplace’ ‘once the obvious problems hav been solved, and the easy solutions gone ....” As technology changes the workplace changes. As the workplace changes there will be new obvious problems. It is sophomoric to envi sion a workplace without problems. As Beaumont manage ment becomes sophisticated in recognizing the capabilities o the Union and its members, the workplace may evolve into more challenging environment with multi-craft work group and semi-autonomous self-managing work groups describe by the author.

The beginning of the Beaumont report quoted Victor Hugo I shall close this discussion on the report with a passage fron William Shakespeare (substitute management for “men”):

“There is a tide in the affairs of men,
Which, taken at the flood, leads onto fortune
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures.”

PAPER NO. 3 SUBMITTED BY DAN SILVERTON, PRESIDENT FEDERAL EMPLOYEES METAL TRADES COUNCIL VALLEJO, CA

Beaumont’s “Problem Solving Teams” project is, by no means, a totally new concept. Quality Circles are probably the best known of various “employee involvement” programs but, the process employed at Beaumont is, in my view, superior to the more conventional Quality Circle process in which circle members “brainstorm” for a problem to solve. In my experience, Quality Circle generated problems are more Iikely to reflect the "creative” interests of the Circle members than any actual problem. Savings obtained from such projects are frequently predicted over an extended period and are usually exaggerated.

The “needs assessment” process utilized at Beaumont increases the probability of genuine problem resolution with measurable payback over a shorter period. The three "problems” reported support this contention.

The Beaumont project appears to contain all the necessary ingredients for success. Those controlling, or facilitating, th project have recognized the need for union acceptance an support and, a quantum advancement, the legitimacy of th union’s need to benefit from the project as well as manage ment. The use of a Consultant, at least initially, should reduc any feelings of mistrust on the part of the union.

I cannot overemphasize the importance of the author’s rec ommendations. Without the whole hearted support of top man agement, Employee Involvement has little chance of success Perhaps, equally important, is the selection of union represent atives capable of accepting change and working cooperatively with managers whale providing necessary balance. I concu with the author’s assessment that a sixteen member steering committee is excessively large.

The resistance by some managers to questions by hourly employees and the "atmosphere of tension possibly some hostility" at the Team's presentation appears to be universal and successful problem resolution may not alleviate the problem if insecure managers feel their control is threatened. Nonetheless, manager hostility must be overcome if long term success is to be realized.

Although the Beaumont project was short lived, each of the three Team problems was solved and, in each case, the solution was reasonably simple to implement, relatively inexpensive, produced a quick payback and is, with minor variations, transportable to other shipyards. More importantly, each of the problems, although simple in nature and solution, existed, for an extended period, either unrecognized or unsolved, prior to involvement of the hourly employees. Employee Involvement has a rightfid place in the work environment and can benefit both employees and managers.

Hopefully, circumstances at Beaumont will allow reimplementation of the Employee Involvement project in the near future. I would be particularly interested in their assessment of "multi-craft" work teams as, in the long term, I believe even greater benefit may be gained through use of multi-craft teams than through the reported Employee Involvement projects and Beaumont, with its' attention to detail and, more importantly, positive attitude, appears the ideal shipyard to test multi-crafting.

The author is to be commended on a thorough report sufficiently detailed to serve as a guide to other shipyards.

PAPER NO. 4 SUBMITTED BY T. A. SOTIR, DIRECTOR OFHUMAN RESOURCES GENERAL DYNAMICS, ELECTRIC BOAT DIVISION

I have reviewed the Beaumont Report entitled "Problem Solving Teams in Shipbuilding" submitted by the Beaumont Yard and offer the following discussion:

The authors of the report need to be complemented on a fine submission not only in format but also in the degree of completeness. Their efforts in capturing and presenting the data in its chronological order was a major assist in the reading of the paper.

The objectives of the paper as stated on page (ii) were "to develop and implement an effective method of establishing problem solving teams which can draw upon the knowledge and experience of all levels of shipyard employees." Additionally, since the project received funding from SP-5, it was necessary to document the approach and learning lessons for use by interested members of the shipbuilding industry. The paper appears to have achieved its objectives by providing learning lessons and defining those learning lessons and pointing out areas of concern which must be addressed.

Any review of the report needs to highlight the sequential steps utilized by the Beaumont Yard. An understanding of these steps, is in my view, the major learning lesson to be derived from the report.

The Beaumont Yard appears to have used the outside consultants both properly and effectively. As demonstrated, in an organized labor environment, this approach may be essential. Unions have become somewhat accustomed to the use of a neutral third party as an aid in bringing both union and management to a common point. I share the view that this approach is the "shoehorn" needed to move into a participative program when resistance on both sides of the bargaining table is present.

The offsite meetings (both the separate and joint sessions), seemed to be a significant factor in the progress made during the early stages. Placement of the activity in a neutral atmosphere for both parties (freeing each from self-imposed limitations) should not be overlooked in moving all participants to an acceptance mode. The Beaumont report supports this. However, the report points out that some mid-management level and above continued to display resistance. No further insight is gained from the report on how to effectively overcome this problem (nor is there a simple solution to the problem). The learning lesson suggested here is the need to maintain a vigilance against this situation even in seemingly positive situations.

Particular mention must be made of the communication program-a thorough, open and continuous approach. This provided the means by which top management displayed its support and participation. A hidden benefit in this communication process was the pressure it exerted on the total organization to provide timely decisions necessary for success.

In reading the report one cannot help but question the total time span to reach a state of fruition. Learning lessons need to be developed and insights given into reducing this span of time.

Page 17 in the report recommends that a committee of less than 16 members be used. From the material presented, I agree that anything larger presents both an unwieldy and untenable situation.

Unfortunately, the business environment for the Beaumont Yard did not allow for developing a continuing program. I agree with the recommendation (page 17 item 4) that "additional options must be available to sustain the effort over along period of time". Such options will have to be developed in a shipyard with a more favorable business climate. Then again a similar process in a prosperous yard would probably be missing one of the key ingredients present in the Beaumont Yard, i.e., the ingredient of survival as a motivational tool.

In summary, the study supports the concept that employee involvement activities in a shipyard environment is feasible, however, leaves unanswered the question how long such an activity can be sustained. The report does provide a basis for developing an implementation plan even in a prosperous shipyard.

PAPER NO. 5 SUBMITTED BY DAN STRAVINSKY, MANAGER LABOR RELATIONS NATIONAL STEEL AND SHIPBUILDING COMPANY SAN DIEGO, CA

The management and unions of the Bethlehem-Beaumont Yard are to be commended for furthering our knowledge of employee involvement as it relates to problem solving teams in a shipbuilding environment. The method by which problems were selected for teams to work on at Beaumont seem to address a number of needs for employee involvement to be successful. These include: work input regarding work related problems, management influence in problem selection, union involvement in the overall process, and the need for employee involvement groups to be focused on highly visible problems which will provide real return to the company and its employees with their solution. This is especially important in the beginning stages of any employee involvement activity.

However, the use of study action teams implies a limited penetration of the organization by the employee involvement process. It is a case of a new system being imposed on an existing organization without the necessary organizational changes necessary to support it.

In Bethlehem's case, a limited number of people were trained in group process and problem solving skills. The training that was provided seemed to be appropriate for the task at hand, however it seemed to miss line supervision and production management, groups which are the linchpins of successful employee involvement. The study action teams were a parallel structure to the existing organization with all the difficulties that this implies. In Bethlehem's case this was dealt with to some extent by involving individuals affected by proposed solutions in the actual problem resolution process. This, however, does not address the basic organizational problem ju noted.

The degree of involvement of Bethlehem's work force wa further reduced by the use of task limited teams. Once a prol lem was resolved, the team ceased to exist. By using this pro ess, team members were denied the continuity of involveme that would be so helpful to developing well functioning tean skilled in problem solving. Unless employees were cycle through teams on a fairly regular basis, their problem solvin skills and ability to work as a member of a team would b difficult to maintain. This would be especially so if the em ployees were returning to a traditional organization.

Despite the apparent shortcomings of the study action tea approach, it appears to be a good process to identify majo problems within the organization and get them resolved. In s doing, a track record is established for employee involveme which may well pave the way for more ambitious attempts t utilize the knowledge and ambition of employees in the wor place. These would include single and multi-craft sel managing work teams referred to in the beginning Beaumont's report.

There is much to learn about employee involvement in shipyard. Dealing with the highly mobile work force withi the shipyard, and with the effects of a lack of job security are challenge to us all. Efforts such as those undertaken b Bethlehem-Beaumont will help lead the way to a more compe itive shipbuilding industry.